Environmental Management Division

Environmental Management Services

AIR QUALITY

IN THE POINT DOUGLAS AREA OF WINNIPEG

DURING JULY AND AUGUST OF 1981

Environmental Standards and Studies

MG-8159

AIR QUALITY

IN THE POINT DOUGLAS AREA OF WINNIPEG

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Air Standards and Studies,
Environmental Management Services.

PROJECT: AIR QUALITY SURVEY OF THE POINT DOUGLAS AREA OF WINNIPEG

Executive Summary

The North Point Douglas area of Winnipeg is a mixture of industrial and residential occupancies. Due to this mix, there has been some citizen concern with regards to air quality and possible deposition of particulate metal dust and polychlorinated biphenyls (PCBs). An inventory of industrial occupancies was undertaken to determine the contaminants of interest and a study of the air quality related to Total Suspended Particulates (TSPs), Cadmium, Arsenic, Chromium, Iron and polychlorinated biphenyls was undertaken in the area in July and August, 1981. Some samples from routine air pollution monitoring stations located in other parts of the city were similarly analyzed for comparative purposes. Results of the TSP sampling indicated that levels at the Point Douglas site occasionally exceeded the Manitoba Air Quality Objectives, but the frequency of these high values lay between that found at the two other Winnipeg locations and does not appear to warrant special concern. Heavy metals analyses of the Point Douglas samples also indicated no significant differences when compared with data collected at the two other Winnipeg locations. Environmental standards in Manitoba, with which to compare the metal results directly, have not been developed but the metal concentrations at all Winnipeg locations were at least two orders of magnitude less than Threshold Limit Values[1] suggested for occupational exposures and are unlikely to be of concern. PCB concentrations at the Point Douglas site were below the analytical method of detection and do not represent a hazard.

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In summary, tests undertaken at the Point Douglas site during July and August, 1981 do not appear to warrant special concern at this time with regard to air quality.

AMC/smp

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ABSTRACT

As a result of citizen concern related to industrial activity in the Point Douglas area, a study into the air quality parameters of Total Suspended Particulate (TSPs), Polychlorinated Biphenyls (PCBs), Cadmium, Arsenic, Chromium and Iron was undertaken. Results of the study indicated that levels of these contaminants were comparable to levels determined at two other Winnipeg locations and to levels in other urban centers. An examination of possible health effects due to the parameters under study indicated that there is no need for special concern in the Point Douglas area at the concentrations found in the study with regard to air quality.

BACKGROUND

The North Point Douglas area of Winnipeg is a mixture of industrial and residential occupancies. Due to this mix, there has been some citizen concern with regards to air quality and possible deposition of particulate metal dust and Polychlorinated Biphenyls.

An inventory of industrial occupancies was undertaken to determine the contaminants of interest and a study of air quality for Total Suspended Particulates, Cadmium, Arsenic, Chromium, Iron and Polychlorinated Biphenyls was undertaken. The list of industries in the area and a map showing their locations appears in Appendix II.

SAMPLING PROTOCOL

The collection of samples in the study was by means of High Volume air samplers which drew large quantities of ambient air (approximately 2,000 m^3 in a 24 hour period) through a filter upon which airborne dust was collected for analysis. The total weight of the collected sample was divided by the total volume of air sampled to generate the average concentration of dust in the air over the 24 hour sampling period. This value is called the Total Suspended Particulate concentration or TSP for short. After the filter had been weighed to generate the TSP concentration, it was chemically analysed to determine the fraction of various components. All samples in this study were analysed for Polychlorinated Biphenyls (PCBs), Cadmium, Arsenic, Chromium and Iron.

The operation involved running two High Volume samplers on alternate days for 24 hours using Gelman type A/E glass fiber filters.

SAMPLING LOCATIONS

In the Point Douglas area, two High Volume samplers were established on the roof of the City of Winnipeg pump station at the corner of Syndicate Street and Rover Avenue. The monitoring station documentation forms Appendix 1.

Two other Winnipeg locations were monitored over the time interval of the study. These locations were at 65 Ellen Street and 299 Scotia Avenue. These locations comprise part of the routine monitoring network of stations making up the National Air Pollution Surveillance system (NAPS network). These samplers routinely provide information on the TSP levels in Winnipeg. Additional heavy metal analyses were performed to provide a basis of comparison with the Point Douglas site. These locations had only one High Volume sampler each for the survey and could thus not provide consecutive 24 hour sequential sampling and therefore were not sampled exactly the same days as the Point Douglas location. The number of samples collected, however, did allow a reasonable basis upon which to make comparisons.

SAMPLING DATES

Point Douglas	65 Ellen St	299 Scotia Avenue
July 28, 29, 30, 31	July 28, 29, 31	July 28, 29, 30, 31
Aug. 2, 5-8, 11-14, 17 to 19.	Aug. 5, 6, 7, 12, 13, 17, 18, 19.	Aug. 2, 5, 6, 7, 8, 11, 12, 13, 14, 17, 18, 19.
Total Samples		
16 days	11 days	16 days

RESULTS

Analysis of all samples was carried out at the Technical Services Laboratory and the results appear in Tables 1 and 2 representing the Point Douglas and two Winnipeg NAPS locations respectively.

TABLE 1

CHEMICAL ANALYSES OF SAMPLES FROM THE POINT DOUGLAS AREA

Results are expressed in units of micrograms per cubic meter of air ($\mu g/m^3$) as a 24-hour average except for PCB's which are expressed in nanograms per cubic meter of air (ng/m^3) as a 24-hour average.

DATE	PCB	TSP	Cd	As*	Cr	Fe
81 07 28	<.026	88	<.004	<.0004	<.019	1.31
81 07 29	<.025	85	<.004	.001	<.019	.75
81 07 30	<.021	71	<.004	<.0004	<.019	.70
81 07 31	<.016	53	<.004	.002	.019	.30
81 08 02	<.013	43	<.003	.006	.017	.28
81 08 05	<.010	45	<.004	.008	.018	.18
81 08 06	<.014	34	<.004	.005	<.019	<.037
81 08 07	<.021	68	<.004	.004	.019	.56
81 08 08	<.012	38	<.004	.002	<.018	<.036
81 08 11	<.042	142	<.004	.002	<.019	1.68
81 08 12	<.029	95	.004	.001	<.019	.46
81 08 13	<.045	151	<.004	.001	<.019	1.44
81 08 14	<.019	64	<.004	.0004	<.019	.19
81 08 17	<.032	107	.004	.008	<.018	1.02
81 08 18	<.039	130	.004	.003	<.018	1.29
81 08 19	<.032	107	<.004	.002	<.019	1.04

< means "less than the detection limit of the instrument above background filter contaminant level".

* not corrected for background filter contaminant level.

TABLE 2

CHEMICAL ANALYSES OF SAMPLES FROM WINNIPEG NAPS
AIR POLLUTION MEASUREMENT STATIONS

299 Scotia Avenue Air Pollution Monitoring Station

DATE	PCB's	TSP	Cd	As*	Cr	Fe
81 07 28	<.077	52	<.003	.004	<.016	1.22
81 07 29	-	44	<.003	.001	.015	.85
81 07 30	<.074	47	<.003	.002	.016	.81
81 07 31	<.050	33	<.003	.004	<.015	.75
81 08 02	<.026	26	<.003	.003	<.015	<.029
81 08 05	<.044	29	<.003	.0003	<.016	.71
81 08 06	<.020	20	<.003	.0008	<.014	.43
81 08 07	<.045	45	<.003	.0018	.016	.89
81 08 08	<.035	35	.003	.0003	.017	1.35
81 08 11	<.088	88	<.003	<.0003	<.016	1.71
81 08 12	<.031	62	<.003	.0009	<.016	.98
81 08 13	<.046	92	<.003	.002	.016	1.51
81 08 14	<.027	54	<.003	<.0003	<.015	.74
81 08 17	<.032	64	<.003	.0003	.016	1.19
81 08 18	<.040	81	<.003	.002	<.017	1.33
81 08 19	<.071	82	<.003	.0003	.016	1.29

65 Ellen Street Air Pollution Monitoring Station

81 07 28	<.077	128	<.003	.002	.022	1.67
81 07 29	<.059	111	<.003	.003	.017	1.44
81 07 31	<.097	65	<.003	.005	<.017	1.00
81 08 05	<.059	59	<.003	.002	<.016	.95
81 08 06	<.022	44	<.003	.002	<.017	.74
81 08 07	<.086	86	<.003	.0009	<.015	1.60
81 08 12	<.052	103	<.003	.003	.017	1.53
81 08 13	<.107	215	<.003	.001	.017	2.50
81 08 17	<.062	124	<.003	<.0003	.015	1.60
81 08 18	<.071	237	<.003	.0006	.017	2.67
81 08 19	<.070	233	<.003	.0006	.016	2.47

All results are expressed in units of micrograms per cubic meter of air ($\mu g/m^3$) as a 24-hour average except PCB's which are expressed in nanograms per cubic meter of air (ng/m^3) as a 24-hour average.

< means "less than the detection limit of the instrument above background filter contaminant level.

* not corrected for background filter contaminant level.

CRITERIA VALUES AND INTERPRETATION OF RESULTS

The Total Suspended Particulate levels at the Point Douglas site exceeded the Maximum Acceptable Level in Manitoba for a 24 hour period, set at 120 $\mu g/m^3$, on three occasions thus representing 19% of the 16 observations. However, the NAPS station (70119) at 65 Ellen Street (downtown Winnipeg) indicated 5 exceedances of the Maximum Acceptable Level which represents 45% of the 11 observations. At the NAPS station (70118) at 299 Scotia Avenue (residential area), the Maximum Acceptable Level was not exceeded. Thus while the TSP values at Point Douglas are higher than guideline levels they do not represent the presence of unusual conditions existing at the Point Douglas monitoring location. Much of this dust may be due to entrained road dust and/or dust from agricultural origin outside the city.

Manitoba does not have a standard or guideline for concentrations of Polychlorinated Biphenyls (PCBs) in air. An average level of PCB in several United States cities is 50 µg/g of TSP[4]. All of the Point Douglas samples were less than 1.5 µg of PCBs per gram of particulate matter which is the detection limit of the analytical method used.

No criteria values for Cadmium, Arsenic, Chromium and Iron exist for Manitoba. However, a comparison of values measured at the Point Douglas location to values at sampling sites at 64 Ellen Street and 299 Scotia Avenue revealed that results were not atypical for the city.

Ontario has published standards for Cadmium, Arsenic, Chromium and Iron which are "½ hour point of impingement standards".

These values can generally be related to 24 hour ambient standards by dividing by a factor of three. The Ontario ½ hour impingement values are as follows:

Substance	Concentration (½ hour) in $\mu g/m^3$
Cadmium	5
Arsenic	75
Chromium	50
Iron	10

None of the measured values exceed the ½ hour point of impingement guidelines. In addition, occupational guidelines for these metals have been proposed by the American Conference of Industrial Hygienists as follows:[2]

Substance	Concentration $\mu g/m^3$
Cadmium (dust and salts) (as Cd)	50
Arsenic and soluble compounds (as As)	200
Chromium (VI) compounds, water soluble compounds	50
Iron salts, soluble as Fe	1000

The above guidelines refer to an occupational exposure of 8 hours per day, 5 days per week. It can be seen that measured values at Point Douglas and other Winnipeg sites are at least two orders of magnitude below these guidelines and are also far below the ½ hour ambient air, point of impingement standards promulgated by the Ontario Government.

SUMMARY

1. While the TSP levels at the Point Douglas location exceeded the Manitoba Maximum Acceptable Levels on three of the sixteen test dates, these values were not significantly different from values at other city locations and do not appear to warrant special concern.
2. The concentrations of Chromium at the Point Douglas and two urban background sites monitored in this study were in reasonable agreement with certain literature values which found a range of concentrations between .0003 - .0145 $\mu g/m^3$ in an urban area[3]. In addition, the concentrations were well below a literature value of .1 - 1.9 $\mu g/m^3$ (quarter year average)[5] where a contributing source existed.
3. The concentrations of Arsenic at the Point Douglas and urban background sites were well below a literature value of .1 - 1.8 $\mu g/m^3$ (quarter year average)[5] where a contributing source existed.
4. Cadmium levels were seldom above the analytical detection level and at least two orders of magnitude below the standards cited earlier in this report.
5. Iron levels in the Point Douglas and urban background stations were approximately the same and all were below the criteria values cited.
6. Polychlorinated Biphenyl concentration at the Point Douglas location were below the detection level of the analytical method used thus indicating no measurable contamination in the areas where the samples were collected.

CONCLUSION

There does not appear to be any evidence at this time to suggest that the Point Douglas area of Winnipeg be singled out for special concern with regard to air quality.

REFERENCES

1. Stern, Arthur C. "Air Pollution" Vol. 1 Academic Press 1976.

2. TLVS. Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1981. Publications Office of the American Conference of Governmental Industrial Hygienists.

3. Muller, J. "Berylium, Chromium and Nickel in Particulate Matter of Ambient Air" in "Management and Control of Heavy Metals in the Environment". CEP Consultants Ltd., Edinburgh England. Sept. 1979.

4. Hutzinger, Otto. "Chemistry of PCBs". CRC Press 1974.

5. Applegate, Howard G. "A survey of Ambient Air Levels of Arsenic and Cadmium in El Paso, Texas from 1972-1979". JAPCA, Vol 31, No. 3. March, 1981.

APPENDIX I

MONITORING STATION DOCUMENTATION

Most of the Monitoring Station Documentation in the following pages is self explanatory. Some additional explanation, taken from the Environment Canada guidebook "Site Documentation for NAPS Network", is provided to cover certain subsections of section C as outlined below:

C-2. Land Use by Section: land uses in each of eight sectors, cross referenced to the site map, are identified. The following descriptors are used:

Descriptor and Characterisitics:

Undeveloped (U): No significant activity; includes parks and pasture land.

Agriculture (A): Active farming.

Light Residential (R1): Four or fewer dwelling units per acre.

Dense Residential (R2): Greater than 4 dwelling units per acre.

Suburban Commercial (C1): Retail businesses in strip development or shopping centres.

Central Commercial (C2): Central business district.

Light Industry (I1): Metal fabrication, warehousing, trucking, etc.

General Industry (I2): Controlled industrial processes.

Heavy Industry (I3): Steel mills, foundries, coking, etc.

Airport (AP): Municipal airport.

C-4. Angle of Elevation: The greatest angle between horizontal plane at probe height and the top of nearby buildings. The direction is given in degrees from North.

C-5. Average Building Height: The average height of buildings immediately surrounding the station.

A map showing land use by section (part C-2) appears at the end of this Appendix.

MONITORING STATION

DOCUMENTATION

NAPS NETWORK

A. General Information:

1. STATION IDENTIFICATION:

NAPS Station No.	81 PD Agency Station No.

2. STATION NAME:

Point Douglas
Building Name, Park Name, etc.

3. CITY:

Point Douglas
Borough or Municipality Name

Winnipeg
City or Metropolitan Area Name

4. STATION ADDRESS:

Syndicate Street and Rover Avenue
Street Number and Street Name

Nearest Cross-Street

5. LATITUDE AND LONGITUDE or UTM CO-ORDS.

49° 55 mins N. Latitude (UTM N)	97° 06 mins W. Longitude (UTM W)

6. POPULATION:

Pop. of Borough or Municipality	Census Year
570,725 Pop. of City or Metropolitan Area	1976 Census Year

7. OPERATING AGENCY:

Air Pollution Control Province of Manitoba
Air Standards and Studies
Agency Name

B. W. Cowan Operator's Name	895-5268 Telephone

8. TIME ZONE:

Central
Time Zone

9. DATE:

810727 Date Station Established	September, 1981 Date Information Last Updated

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MONITORING STATION

DOCUMENTATION

NAPS NETWORK

B. Instrument Details

INSTRUMENT TYPE	OWNER	MAKE	MODEL	DATE INSTALLED	DETECTION PRINCIPLE	RANGE USED (PPM)	SAMPLING HEIGHT ABOVE GRADE (METERS)	SAMPLING LINE LENGTH (METERS)
SUSPENDED PARTICULATE	PMRAVN	General Metal Works		810727	Hi Vol. Sampler		3 meters	None
SOILING INDEX								
SULPHUR DIOXIDE								
CARBON MONOXIDE								
NITROGEN DIOXIDE								
OZONE								
DUSTFALL								
SULPHATION								

TELEMETRY: [ ]

PAGE NO. _____

MONITORING STATION

DOCUMENTATION

NAPS NETWORK

C. Site Description

1. SCALE OF REPRESENTATIVENESS:

2. LAND USE BY SECTOR: (see map)

1.	U	5.	R1
2.	R1	6.	I1
3.	R1	7.	I1
4.	R1	8.	R1

3. SITE ELEVATION (above sea level): 229 m.

4. ANGLE OF ELEVATION TO NEARBY BUILDINGS:
   1. Greatest Angle: °
   2. Bldg. Direction: °

5. AVERAGE BUILDING HEIGHT IN AREA: Homes, 2 storey 7 meters m.

6. AIRFLOW RESTRICTIONS: (YES/NO) yes
   NORTH: trees SOUTH:
   EAST: WEST:

7. DISTANCE TO NEAREST TREES: 5 m.

8. MANIFOLD: N/A
   1. Type:
   2. Distance from Supporting Structure:

9. METEOROLOGICAL INFORMATION:
   1. Type: Complete Information
   2. Address: Winnipeg International Airport
   3. Distance from station: 7.5 km.
   4. Contact: Atmospheric Environment Service, 1000-266 Graham Avenue, Winnipeg, Manitoba.

MONITORING STATION

DOCUMENTATION

NAPS NETWORK

D. Site Influences

1. LOCALIZED SOURCES:
(within 200m of monitor)

Source Type	Distance (m.)	Description
	25	House
	5	Trees

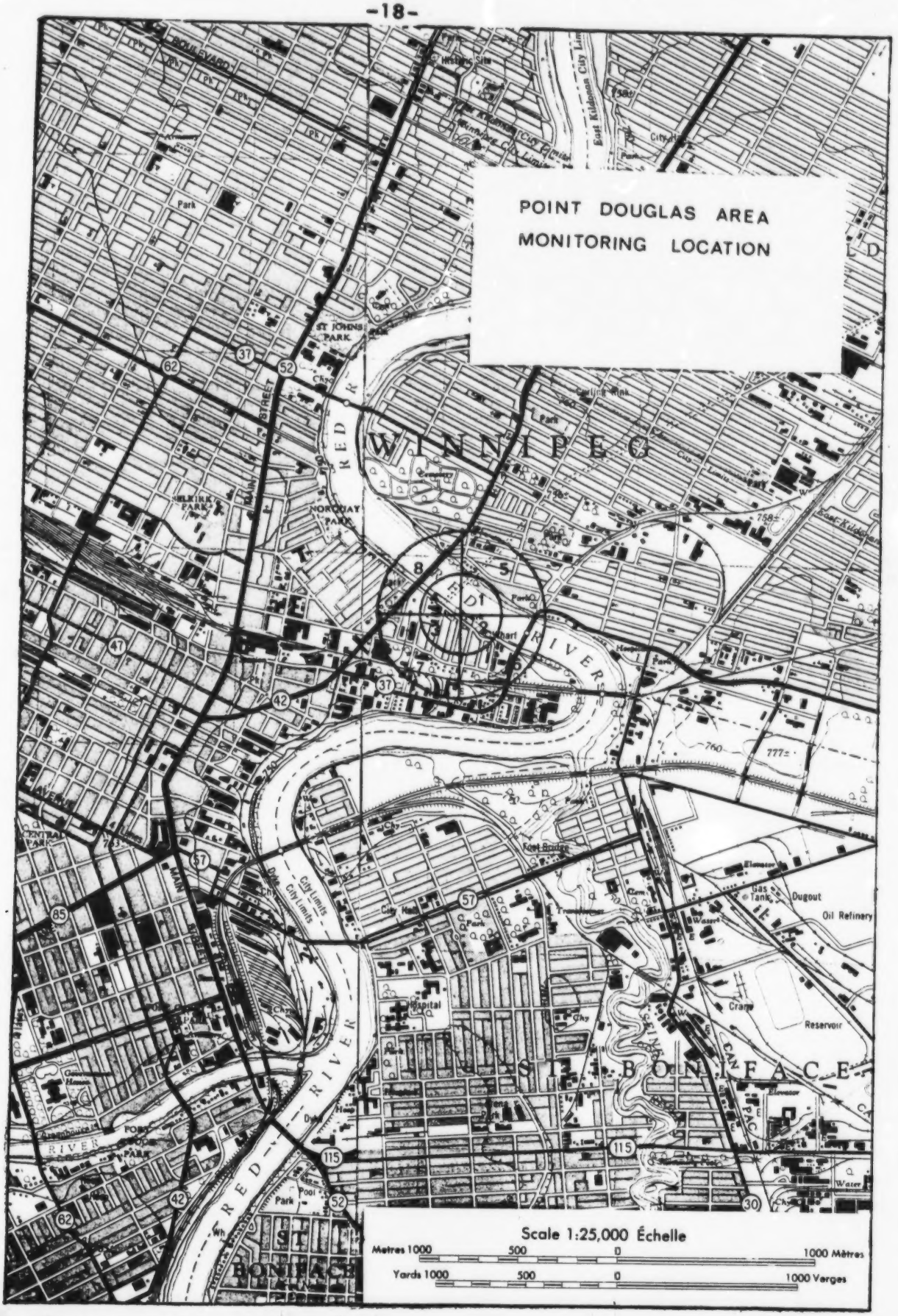
2. ROADWAY INFLUENCES:

Name	Type	Volume	Distance (m)	Direction (Degrees)
Rover E-W	Paved		3 metres	
Syndicate N-S	Paved		5 metres	

3. MAJOR POINT SOURCES:

Map Number	Source Name	Source Type	Production Capacity	Distance from site (km)	Compass Direction (Degrees)

see list of major industries in Point Douglas area.


POINT DOUGLAS AREA
MONITORING LOCATION
WINNIPEG
ST. BONIFACE
RED RIVER
ST. JOHNS PARK
NORQUAY PARK
KILDONAN PARK
CENTRAL PARK
ROSS HOUSE PARK
Fort Gibraltar
Fort Rouge
Dugout
Oil Refinery
Reservoir
Hospital
City Limits
Scale 1:25,000 Échelle
Metres 1000 500 0 1000 Mètres
Yards 1000 500 0 1000 Verges

APPENDIX II

Point Douglas Area - Major Industries

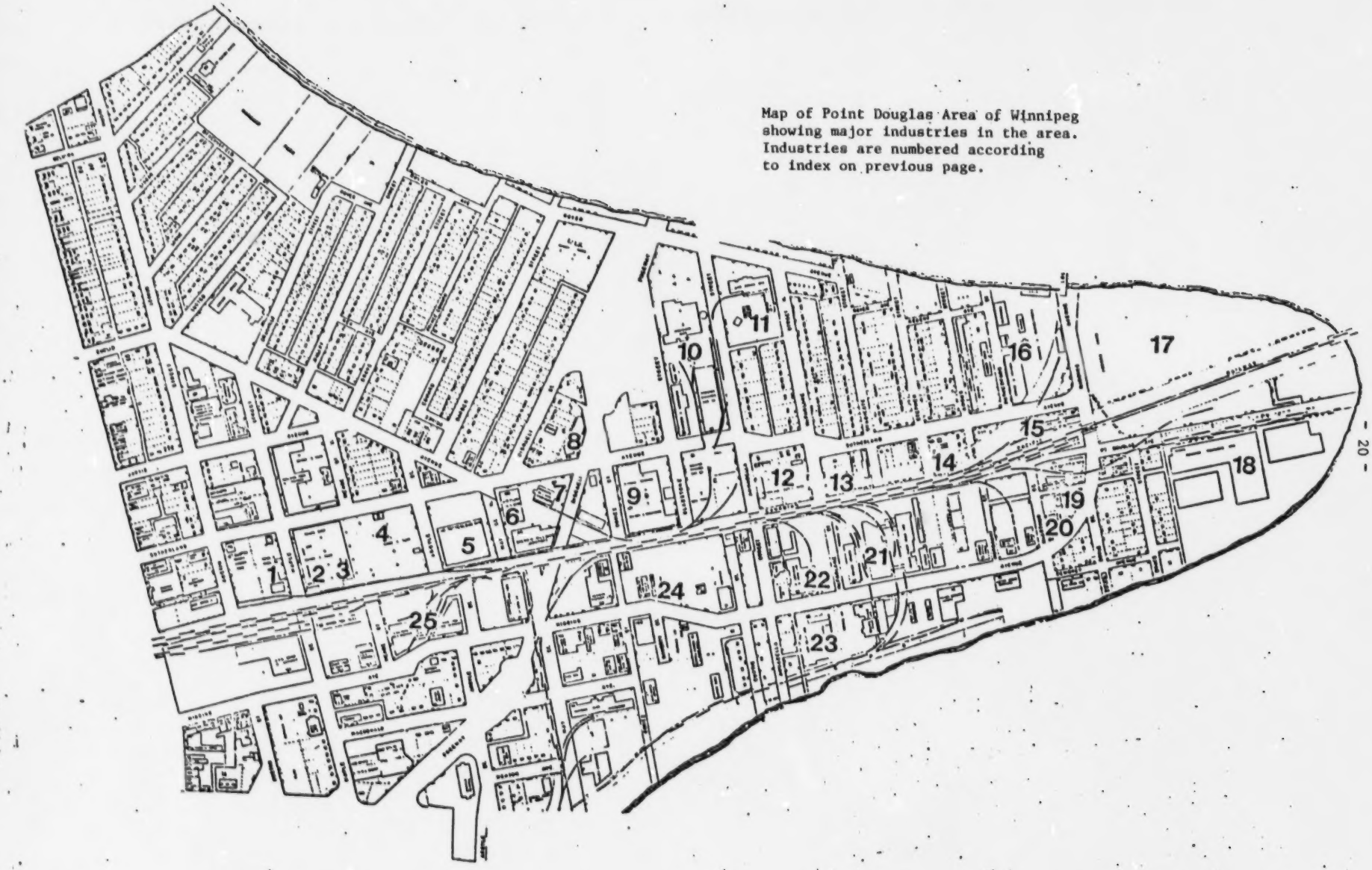
Sutherland Avenue

1. American Scrap
2. Canada Foam
3. Namasco
4. Gateway Packers
5. Sherwin Williams
6. Airflow
7. Modular 5 Sealy
8. Frontier Manufacturing
9. Simmons
10. Greater Winnipeg Gas
11. Winnipeg Hydro Terminal
12. Western Machine Works
13. Western Scrap
14. Monarch Metal
15. Soo - Line
16. Brown and Rutherford

Higgins Avenue

17. Marina
18. Building Products
19. Thor Machinery
20. Point Douglas Auto Body
21. Ogilvie Mills
22. Edward Chemical
23. Kipp Kelly
24. Orluff Scrap
25. Manitoba Cold Storage

Also: Disraeli Freeway, Sutherland and Higgins (Major Truck Routes);
CPR Mainline Station



Map of Point Douglas Area of Winnipeg showing major industries in the area. Industries are numbered according to index on previous page.